

NC STATE BUILDING CODE 1980
VOLUME II, PLUMBING
REVISION 2

C692.9
N8763
V.2
1980
Rev. 2
(Mar. 1985)

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Rev.2(Mar. 1985)

NORTH CAROLINA STATE BUILDING CODE 1980

VOLUME II, PLUMBING

REVISION 2

This revision represents changes to the North Carolina State Building Code, Volume II, Plumbing. 1980 Edition. These are the accumulative changes of the Code through March 12, 1985. It is requested that you follow checking slip below for revision I.

Both Revision Nos. 1 and 2 are required to update 1980 Edition thru March, 1985.

CHECKING SLIP

Replace (check paragraph below) pages:

5-16, 6-4, 6-5, 12-12, 12-15, 12-17, 13-4, C-4.

Remove old pages of same numbers as above and at the same time you are replacing or inserting pages from the checking slip.

Each page that is inserted will have the date on the lower corner to match the date of March, 1985.

If any pages are missing or you do not receive a complete set for each North Carolina State Building Code, Volume II, Plumbing, please notify:

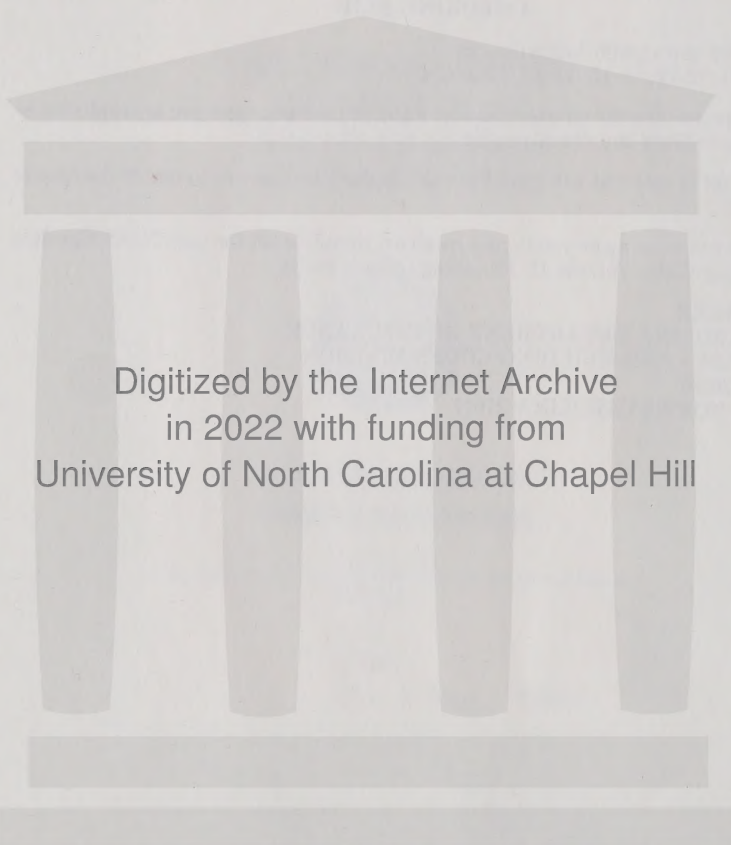
JACKIE BAKER

NORTH CAROLINA DEPARTMENT OF INSURANCE

ENGINEERING AND BUILDING CODES DIVISION

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FOREWORD

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(MAR. 1985)

North Carolina has been a pioneer in the field of Statewide Building and Fire Prevention regulations which have been enacted for the protection of the public. The Building Laws passed in 1903 and 1905 created a Building Code for materials and methods of construction in use at that time.

The General Assembly of 1933 created a Building Code Council and authorized it to, in cooperation with the Commissioner of Insurance, prepare and adopt a Building Code. The first North Carolina Building Code received the approval of the official Building Code Council and the Commissioner of Insurance in 1935 and was printed that same year. The General Assembly of 1941 ratified and adopted this edition, which was known as the 1936 Edition.

The 1936 Edition contained a State Plumbing Code. It was rewritten by the State Board of Health and the Building Code Council in 1954. The 1954 Edition was printed as Article XX of the State Code and it was bound in the 1958 Edition. The 1933 Building Code Council authorized cities and towns to make changes in the State Code as long as they were more stringent. However, many cities and towns and counties rewrote the State Code and some adopted a plumbing code of their own thus providing for different plumbing regulations in many areas of the State.

The 1957 Legislature rewrote the 1933 Building Code Council Act and re-organized and expanded the Council. All local Codes different from the State Code were required to be approved by the Council.

The technical provisions herein are taken from the 1962-1963 Edition of the Southern Standard Plumbing Code with 1964-66 Amendments published by the Southern Building Code Congress which is based mainly on the 1955 Edition of the National Plumbing Code, ASA, A40.8—1955.

The Code is presented with the hope that its use will protect the public from dangerous and unsanitary buildings and will provide Architects and Engineers a set of minimum standards to follow in designing buildings. The Building Code Council has authority to make changes in the Code when the wider use of materials and methods comply with standards set forth in the Laws. From time to time, there will be modifications and changes in the Code.

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By Statute the Commissioner of Insurance has general supervision of the administration and enforcement of the North Carolina Building Code and the Engineering Division serves as the staff for the Building Code Council. Officials of the Insurance Department are:

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Commissioner

LEE HAUSER, P.E.
Deputy Commissioner and
Secretary to Council

**ENGINEERING AND BUILDING CODES DIVISION
RECOMMENDATION ON THE ADMINISTRATIVE PROCEDURES ON THE
ENFORCEMENT OF INSTALLATION PROCEDURES REQUIRED FOR
ASTM D2751, D3033, and D3034—FLEXIBLE THERMOPLASTIC SEWER PIPE**

The installation procedures for this pipe require special precautions to make sure the soil surrounding the pipe imparts equal pressure around the circumference of the pipe which is critical for this pipe but not for the thicker wall plastic pipe and other types of sewer pipe, and for this reason the Engineering Division and several members of the Building Code Council stated that the Division should issue Administrative Recommendations to assist in enforcement which must be assured for proper performance of the pipe in various soils.

The Engineering Division recommends that local inspectors issue permits on the use of this pipe under the following conditions in order to assure more reliability of placing the responsibility of the required installation procedures on the designers and installers or inspectors whichever permit method is used.

(1) Permits for Engineered Design Systems Certified by Engineer—Permits should be used for these systems in any class of soil permitted by ASTM 2321 where the licensed architect or licensed engineer will file a certificate with the inspection department that he is familiar with ASTM 2321-74. (Installation Standards for Flexible Thermoplastic Sewer Pipe and Fittings) when the permit is issued and will file a certificate that the pipe has been installed in accordance with ASTM 2321-74 Installation Standards for Thermoplastic Sewer Pipe and Fittings after the installation has been made.

(2) Permit for Non-Engineered Systems Certified by Installer—Permits should be issued to the installer if the installer certifies that he is familiar with 2321-74 and that he will install Class I or Class II material (Granular sands and gravel materials) as bedding, haunching and initial backfill at the time the permit is issued and will file a certificate with the inspector, after the installation, that he has installed the ASTM 2751, D3033 and D3034, Flexible Thermoplastic Sewer Pipe and Fittings with Class I and Class II material (Granular sands and gravel materials) as bedding 6" underneath the pipe, Haunching and initial backfill of 6 to 12 inches above the pipe. In instances where the local inspector is not assured by the installer that Class I and Class II (Granular sands and gravel material) materials will be used, he may require certification by a licensed engineer or architect that the pipe has been installed in conformance with ASTM 2321-74.

(3) Permits for Non-Engineered Systems More Closely Inspected by the Inspection Department—Permits should be issued to installers of flexible thermoplastic sewer pipe in soils where the inspector has determined that the native soil is Class I or II materials (Granular sands and gravel materials). In cases he is assured by the installer that the installer will haul in Class I and II materials (Granular sands and gravel materials) for bedding 6 inches underneath the piping, haunching and initial backfill of 6 to 12 inches above the pipe and the inspection department has sufficient personnel to inspect the installations at the time the hauled in material is being placed, permit should be issued to such installers.

(4) Other Permit Methods—In addition to the above, methods of issuing permits any inspector who feels that he is sufficiently knowledgeable and experienced in soil identification, he may issue permits under any other system which will assure the owner that the pipe is installed in conformance with ASTM D2321-74.

Section 506

506 Limitation of use of Materials Listed in Table 505.

506.1 Asbestos Cement Sewer Pipe.

For uses see Sections 602.11, 1302.1, 1501.5, 1502.4 and 1502.5.

506.2 Bitumized Sewer Pipe and Fittings.

For uses see Sections 602.11, 1302.1, 1501.5, 1502.4 and 1502.5.

506.3 SRP—Plastic Pipe and Fittings.

For storm sewers, storm drain pipe and fittings out side the building see Sections 1501.5 and 1502.5.

506.4 Plastic Materials.

For uses see Sections 502, 703, 704, 909 and Table under Note 4 of Section 501.3.

506.5 DWV—Copper Drainage Tube.

For above ground drainage waste and vents "Except urinal waste and vents."

506.6 Plastic Pipe and Fittings Pressure Rated For Water Service Pipe—

- (a) In Table 505 these numbers are listed under "Materials" column which represents the ASTM designation numbers assigned to those materials by the joint ASTM-NSF-PPI committee to assist in quick, easy identification of the materials. The numbers appear as a part of the marking on the pipe and/or tubing. These and no others are approved.
- (b) All plastic pipe and fittings approved in Table 505 shall be properly marked as specified by their respective standards. All material shall be installed as recommended by the manufacturer and/or the Plastics Pipe Institute. All water service piping shall have a minimum working pressure of 160 psi, with permanent identification markings.
- (c) No existing metallic water service piping used for electrical grounding shall be replaced with non-metallic pipe or tubing until other grounding means are provided which are satisfactory to the proper administrative authority having jurisdiction.
- (d) "Polybutylene piping per ASTM D3309 marked for 100 psi pressure at 180°F may be substituted for D2662, D2666, or other piping in water supply lines from supply source to residential interior systems."

NOTE: Section 2501 (a) and (c) of Volume I states that no combustible materials shall enter into construction of wall, floor and roof assemblies unless such assemblies have been tested in accordance with ASTM-E-119 where the code requires such assemblies to have an hourly fire resistance rating.

507—Used Plumbing Fixtures, Piping, Equipment, and Accessories.

Before installation all used plumbing fixtures, piping, equipment and accessories shall be inspected and approved by the Plumbing Inspector.

When necessary to cut a new taper or pipe end in the field, a tapering tool designed for this purpose shall be used.

602.12 Bituminized Fiber Joints.

Joints in bituminized fiber pipe shall be made with tapered type couplings of the same material as the pipe. Joints between bituminized fiber pipe and metal pipe shall be made by means of an adapter coupling calked as required in paragraph 602.1.

When necessary to cut a new taper or pipe end in the field, a tapering tool designed for this purpose shall be used.

602.13 Elastomeric Compression Gasket Joints for Cast Iron Soil Pipe

(a) A positive-seal one piece elastomeric compression type gasket may be used for joining hub and spigot cast iron soil pipe as an alternate for lead and oakum joints, which is made by inserting an approved gasket in the hub. The inside of the gasket is lubricated and the spigot end of the pipe is pushed into the gasket until seated, thus effecting a positive seal.

(b) Joint for hubless cast iron soil pipe and fittings shall be made with an approved elastomeric sealing sleeve and a corrosion-resistant clamping device.

602.14 High Silicon Iron Pipe Joints.

Series 300 stainless steel coupling or drawbend with intermediate sleeve and nonporous inner sealing sleeve of sintered polytetrafluorethylene, to be molded of a single and continually joined ring type sleeve; and stainless steel nuts and bolts to be used for joining high silicon iron waste pipe and fittings.

602.15 Borosilicate Glass Joints.

Joints in borosilicate glass waste systems, vents, etc., shall be made with a stainless steel compression coupling bead to bead, or other non-corrosive coupling as may be approved by the administrative authority. Band, bolt and nut shall be of 300 series stainless steel, the band to surround a sleeve made of acrylonitrile rubber, inside the rubber sleeve of fluorocarbon polymer. Only the liner is to come in contact with contents of pipe.

602.16 Borosilicate Glass Drainline Joints.

Glass to glass connections shall be made with a bolt compression type stainless steel (300 series) coupling with contoured Buna-N resilient compression ring and a fluorocarbon inner seal ring, or other non-corrosive coupling as may be approved by the administrative authority.

Joints between glass drainline and other types of piping material shall be made with adapters having a TFE seal and/or according to manufacturer's recommendations.

Calked joints shall be as provided in Section 602.1 or packed with acid resistant asbestos rope and calked with acid proof cement.

602.17 Joints for Modified Epoxy Resin Pipe

Series 300 stainless steel or drawbend with intermediate neoprene sleeve and nonporous inner sealing sleeve of sintered polytetrafluorethylene, similar to DuPont Teflon (R), to be molded of a single and continually joined ring type sleeve; and stainless steel nuts and bolts to be used for joining modified epoxy resin pipe and fittings.

Section 603

602.18—Joining Plastic Water Service Piping

Plastic pipe and fittings for water service piping may be of the insert type, solvent cemented, hot or cold flared or a *pressure lock (which includes an internal elastomeric seal and metal retainer clip)* fitting as recommended by the manufacturer and/or the Plastic Pipe Institute for the particular materials being used.

602.19—Joints for Plastics Pipe and Fittings

Joints for all types of Plastics Pipe and Fittings shall be made in strict accordance with the joining techniques recommended for the various materials.

In Solvent cementing, all joints shall be square cut, all pieces shall be seated to the bottom of the fitting socket. In no case shall stress be applied at the joint for offsetting the pipe. No combination or aerosol cements shall be used. All cements shall be that designated for the particular materials being used. All shall in all cases, bear the seal of approval of the NSF. All defective joints shall be removed and replaced.

Transition to other materials shall be through proper adaptor fittings only.

Plastics Pipe and Fittings for sewer and water pressure lines may also be jointed by use of elastomeric joints where the respective standards for the materials so specify. The joints shall comply with the standards listed in Table 505 for elastomeric joints.

602.20 MECHANICAL JOINTS

"Joints between different piping materials may be made with a mechanical joint of the compression or mechanical sealing type. Joints shall be installed in accordance with the manufacturer's instructions."

Flexible couplings may be used to join the plain ends of similar or dissimilar pipes. The flexible coupling shall consist of an approved elastomeric sleeve that is attached to the pipe with adjustable clamps made of series 300 stainless steel.

603 Use of Joints.

603.1 Clay Sewer Pipe.

Joints in vitrified clay pipe or between such pipe and metal pipe shall be made as provided in paragraphs 602.6 and 602.7.

603.2 Concrete Sewer Pipe.

Joints in concrete sewer pipe or between such pipe and metal pipe shall be made as in paragraphs 602.6 and 602.7.

603.3 Cast Iron Pipe.

Cast Iron Pipe Joints in cast iron pipe shall be either caulked, screwed, positive-seal elastomeric compression gasket or an approved elastomeric sealing sleeve and a corrosion-resistant clamping device as provided in Sections 602-1, and 602.13(a), and 602.13(b).

603.4 Screw Pipe to Cast-Iron.

Joints between wrought-iron, steel, brass, or copper pipe, and cast-iron pipe shall be either calked or threaded joints made as provided in paragraphs 602.1 and 602.2 or shall be made with approved adapter fittings.

603.5 Lead to Cast-Iron, Wrought-Iron or Steel.

Joints between lead and cast-iron, wrought-iron, or steel pipe shall be made by means of wiped joints to a calking ferrule, soldering nipple, or bushing as provided in paragraph 602.3.

603.6 Copper and Stainless Steel Water Tube

Joints in copper and stainless steel tube shall be made in accordance with the requirements in Section 602.4 for soldered joints, Section 602.5 for flared (compression) joints or Section 602.8 for brazed joints.

604 Special Joints.**604.1 Copper and Stainless Steel Tube to Screwed Pipe Joints.**

Joints from copper or stainless steel tubing to threaded pipe shall be made by the use of brass adapter fittings. The joint between the copper or stainless steel tube and fitting shall be properly soldered or brazed and the connection between the threaded pipe and the fitting shall be made with a standard pipe size screw joint.

604.2 Welding or Brazing.

Brazing or welding shall be performed in accordance with requirements of recognized published standards of practice and by licensed or otherwise qualified mechanics, except when it is determined by the Plumbing Official to be equivalent procedure for the purpose of this Code.

604.3 Slip Joints.

Slip joints may be used on exposed tubular traps on the trap seal and also the inlet and outlet side of the trap. Slip joints in water piping may be used on the exposed fixture supply only.

604.4 Expansion Joints.

Expansion joints must be accessible and may be used where necessary to provide for expansion and contraction of the pipes.

604.5 Ground Joint Connections.

Ground joint connections which allow adjustment of tubing but provide a rigid joint when made up shall not be considered as slip joints.

604.6 Mechanical Pipe Couplings and Fittings

Mechanical pipe couplings and fittings in accordance with (a) and (b) below may be used for roof or storm drains, cold domestic water pipe, fire protection standpipes, and chilled and condenser water piping in air conditioning systems.

- (a) Mechanical couplings shall be with housing fabricated in two or more parts of malleable iron castings, in accordance with Federal specifications QQ-I-666C, Grade II. Coupling gasket shall be molded synthetic rubber, per ASTM D-735-61, Grade No. R615BZ. Coupling bolts shall be oval neck track head type with hexagonal heavy nuts per ASTM A-183-60.
- (b) All pipe fittings used shall be fabricated of malleable iron castings in accordance with Federal Specifications QQ-I-666C, Grade II. Where malleable fitting pattern is not available, fittings fabricated from schedule 40 steel pipe or standard wall seamless welding fittings with grooved ends may be used.

604.7 Field Formed Tee Connections

As an alternative method for a branch, a collar may be drawn from copper tubing by drilling and then drawing out the tube surface to form a collar by use of an appropriate tool for this purpose. The height of the collar shall be no more than three times the thickness of the copper tube wall.

Section 607

The collar shall be perfectly round and the space between the inside surface of the collar and the outside surface of the joining branch tube shall conform to the spacing as provided when brazing fittings are used.

An appropriate tool designed for the purpose shall be used to notch the end of the joining branch tube and to form a shoulder or dimple that will set the proper penetration depth of the branch tube into the fitting.

The brazing shall be in accordance with Section 602.8 using BCu series filler metal.

605 Unions (Screwed).

605.1 Drainage System.

Unions may be used in the trap seal and on the inlet side of the trap. Unions shall have metal-to-metal seats.

605.2 Water-Supply System.

Unions in the water-supply system shall be metal-to-metal with ground seats.

606 Water Closet, Pedestal Urinal, and Trap Standard Service.

606.1

Fixture connections between drainage pipes and water closets, floor-outlet service sinks, pedestal urinals, and earthenware trap standards, shall be made by means of brass, approved plastic, wrought copper, wrought copper alloy, hard-lead, or iron flanges, calked, soldered, or screwed to the drainage pipe. The connection shall be bolted with an approved gasket or washer or setting compound between the earthenware and the connection. The floor flange shall be set on an approved firm base. The use of commercial putty or plaster is prohibited.

607 Prohibited Joints and Connections.

607.1 Drainage System.

Any fitting or connection which has an enlargement, chamber, or recess with a ledge, shoulder, or reduction of pipe area, that offers an obstruction to flow through the drain, is prohibited.

607.2

No fitting or connection that offers abnormal obstruction to flow, shall be used. The enlargement of a 3-inch closet bend or stub to 4-inches shall not be considered an obstruction.

608 Waterproofing of Openings.

608.1

Joints at the roof, around vent pipes, shall be made water-tight by the use of lead, copper, galvanized-iron, or other approved flashings or flashing material. Exterior-wall openings shall be made water-tight.

609 Increases and Reducers.

609.1

Where different sizes of pipes, or pipes and fittings are to be connected, the proper size increasers or reducers or reducing fittings shall be used between the two sizes.

- (6) Non-potable water lines.
- (7) The size and material of irrigation water piping installed outside of any building or structure and separated from the potable water supply by means of an approved air gap or backflow prevention device is not regulated by this code. The potable water piping system supplying each such irrigation system shall be adequately sized as required elsewhere in this chapter to deliver the full connected demand of both systems.

1213.2

When required by the Plumbing Official, the sizing of the water-distribution system shall be calculated by a registered mechanical engineer or other acceptable authority.

1213.3 Size of Fixture-Supply.

The minimum size of a fixture-supply pipe shall be as follows:

Type of Fixture or Device	Pipe Size (Inches)	Type of Fixture or Device	Pipe Size (Inches)
Bath Tubs	$\frac{1}{2}$	Sinks Flushing Rim	$\frac{3}{4}$
Combination Sink and Tray	$\frac{1}{2}$	Urinal (Flush Tank)	$\frac{1}{2}$
Drinking Fountain	$\frac{3}{8}$	Urinal (Direct Flush Valve)	$\frac{3}{4}$
Dishwasher (Domestic)	$\frac{1}{2}$	Water Closet (Tank Type)	$\frac{3}{8}$
Kitchen Sink, Residential ...	$\frac{1}{2}$	Water Closet (Flush Valve Type)	1
Kitchen Sink, Commercial ...	$\frac{3}{4}$	Hose Bibbs	$\frac{1}{2}$
Lavatory	$\frac{3}{8}$	Hose Bibbs— Toilet Rooms	$\frac{1}{2}$
Laundry Tray, 1, 2 or 3 Compartments	$\frac{1}{2}$	Wall Hydrant	$\frac{1}{2}$
Shower (Single Head)	$\frac{1}{2}$	Washing Machines	$\frac{1}{2}$
Sinks (Serv., Slop)	$\frac{1}{2}$		

For fixtures not listed, the minimum supply branch may be made the same as for a comparable fixture.

1213.4 Minimum Pressure.

Minimum, fairly constant, service pressure, at the point of outlet discharge shall be not less than 8 psi. for all fixtures except for direct flush-valves, for which it shall be not less than 15 psi., and except where special equipment is used requiring higher pressure. In determining the minimum pressure, allowance shall be made for the pressure drop due to friction loss in the piping system during maximum demand periods as well as head, meter, and other losses in the system.

1213.5 Auxiliary Pressure, Supplementary Tank.

If the residual pressure in the system is below the minimum allowable at the highest water outlet when the flow in the system is at peak demand, an automatically controlled pressure tank or gravity tank shall be installed, of sufficient capacity to supply sections of the building installation which are too high to be supplied directly from the public water main.

TABLE 12-A
Equivalent Fixture Units

(Includes Combined Hot and Cold Water Demand)

Fixture	Number of Fixture Units	
	Private Use	Public Use
Bar sink	1	2
Bathtub (with or without shower over)	2	4
Dental unit or cuspidor	—	1
Drinking fountain (each head)	—	1
Hose bibb or sill cock (standard type)	3	5
House trailer (each)	6	6
Laundry tub or clotheswasher (each pair of faucets)	2	4
Lavatory	1	2
Lavatory (dental)	1	1
Lawn sprinklers (standard type, each head)	1	1
Shower (each head)	2	4
Sink (bar)	1	2
Sink or dishwasher	2	4
Sink (flushing rim, clinic)	—	10
Sink (washup, each set of faucets)	—	2
Sink (washup, circular spray)	—	4
Urinal (pedestal or similar type)	—	10
Urinal (stall)	—	5
Urinal (wall)	—	5
Urinal (flush tank)	—	3
Water closet (flush tank)	3	5
*Water closet (flushometer valve)	6	10
■ Water closet, low flush type	1	

Water supply outlets for items not listed above shall be computed at their maximum demand, but in no case less than

3/8 inch	1	2
1/2 inch	2	4
3/4 inch	3	6
1 inch	6	10

*See subsection (j) of Section 1213.1 for method of sizing flushometer valve installations using Table 12-B

(f) Provision shall be made to permit water on the building side of the reducing valve to flow back into the main when the building pressure exceeds the main supply pressure due to thermal expansion. Reducing valves with build-in by-pass check valves will be acceptable.

An integral by-pass check valve shall be capable of opening to permit a reverse flow of water through the reducing valve to prevent a build-up of system pressure by thermal expansion of the water with an increase of reduced pressure not exceeding 2 psi above the prevailing initial pressure.

(g) The valve shall be designed to fall open to permit uninterrupted water flow.

(h) All regulators and strainers must be so constructed and installed as to permit repair or removal of parts without breaking a pipe line or removing the valve and strainer from the pipe line.

1214 Hot-Water Distribution.

1214.1 Hot-Water Distribution Piping.

The sizing of the hot-water distribution piping shall conform to good engineering practice (See paragraph 1213.1).

1214.2 Hot Water Supply.

The hot water supply on any fixture requiring hot water shall be installed on the left side of the fixture unless otherwise specified by the manufacturer.

1214.3 Shower Water Temperature Control

"The temperature of hot water supplied to showers in all occupancies, except living units that have individual water heaters, shall be a maximum of 116°F or the shower shall be controlled by an anti-scald valve of the pressure balance or thermostatic mixing type. Multiple shower units may be controlled by a master anti-scald valve."

1215 Hot Water Tanks or Heaters and Safety Devices.

1215.1 General.

(a) All automatically fired water tanks shall be equipped with the following minimum controls and devices as applicable:

- (1) Operating temperature controls.
- (2) High Limit temperature control with maximum thermostetting of 210° F. (energy cut-off).
- (3) A positive flame failure cut-off.
- (4) Approved and listed burner and controls;
Gas-fired—American Gas Association.
Oil-fired—Underwriter's Laboratories.
- (5) An approved type pressure relief and temperature relief valves or and approved type combination thereof. New installations shall comply with General Statutes 66-27.1 (see appendix). Temperature relief ratings shall be in accordance with ASA standard Z21.22 (1958).

(b) No individual, firm, corporation, or business shall install, sell or offer for sale any automatic hot water tank or heater of 120 gallon capacity or less which does not have installed thereon by the manufacturer

Section 1214

of such tank or heater an American Society of Mechanical Engineers and National Board of Boiler and Pressure Vessel Inspectors approved type pressure-temperature relief valve, and so labeled by the manufacturer's identification stamped or cast upon the tank or heater or upon a plate secured to it.

(c) Relief valves shall be connected to the top of the tank with the spindle vertical, if possible, either directly to a tapped or flanged opening in the tank, or to a fitting connected to the tank by a close nipple. The temperature sensing probe shall be actuated by the water within the top six inches of the tank and the relieving capacity of any one valve shall equal or exceed the heat (BTU's) input of the heater or to the storage tank. Relief Valve pressure setting shall not exceed the tank or heater manufacturer's rated working pressure and thermosetting shall not exceed 210° F. The outlet of a pressure, temperature, or other relief valve shall not be connected to the drainage system as a direct waste, but shall be piped to a floor drain or other location that will reduce the possibility of personal injury if the valve should discharge. Discharge piping, if any, to be same size as relief valve outlet, or larger, and the termination shall not be threaded.

(d) For installation with a separate storage tank, relief valves shall be installed on the tank and there shall not be any type of valve installed between the water heater and the storage tank. When shut-off valves are provided between the heater and storage tank, additional approved type safety relief valve(s) shall be installed on the heater.

(e) Dip tubes, supply and hot water nipples, supply water baffles or heat traps when used in hot water supply storage tanks or heaters shall be constructed and tested to withstand a temperature of 400°F. without deteriorating in any manner, and the tank so labeled by the manufacturer.

(f) Copper or steel coil tube type hot water supply heaters which are not covered by the ASME Boiler Code that have been designed and constructed as safe as otherwise provided in the ASME Code and are AGA or U. L. approved shall be equipped with approved safety devices as required by this section.

(g) A hot water supply or storage tank, fired or unfired, shall not be used for space heating if the water temperature exceeds 150°F.

(h) All storage tanks shall have clearly and indelibly stamped in metal, or so marked upon a plate welded thereto, or otherwise permanently attached, the maximum allowable working pressure. Such markings shall be in an accessible position outside of the tank so as to make inspection or reinspection readily possible. All storage tanks for domestic hot water shall meet the applicable ASME standards.

(i) All electric, gas and oil water heaters must be approved and listed by nationally recognized testing laboratories such as A.G.A., U.L., etc.; and all hot water tanks (fired or unfired) shall bear the ASME label of approval when required. The maximum allowable working pressure of a tank or heater shall in no case exceed the pressure indicated by the manufacturer's identification stamped upon the tank or upon a plate secured to it.

(j) Flue Connection—Each fired tank or fired coil heater shall be equipped with a minimum three inch diameter vent pipe or flue connected to an approved gas vent or chimney meeting the requirements of the State Building Code.

1215.2

Tanks or heaters that exceed any of the following limitations shall meet the requirements of the ASME Boiler Code, Section VIII and conformity shall be certified by the inspection and stamping of the National Board of Boiler and Pressure Vessel Inspectors.

- (1) A heat input of 200,000 BTU's per hour.
- (2) A water temperature of 200°F.
- (3) A nominal water containing capacity of 120 gallons.

(a) Each hot water supply tank or heater of more than 120 gallon capacity shall have at least one officially-rated ASME and NB approved type pressure relief valve or at least one officially-rated ASME and NB approved type pressure-temperature relief valve of the automatic reseating type set to relieve at or below the maximum allowable working pressure of the tank. When more than one relief valve is used on either hot water heating or hot water storage tanks, the additional valve or valves shall be officially-rated ASME and NB approved type and shall be set within the range not to exceed 20% of the lowest pressure at which any valve is set. Relief valve shall be spring loaded without disc guides on the pressure side of the valve. Relief valves shall be so arranged that they cannot be reset to relieve at a higher pressure than the maximum permitted by this paragraph.

(b) Pressure reducing valves shall be used in the water supply to the heater or tank where the static water pressure exceeds 75% of the water working pressure of the heater or tank.

(c) There shall be a stop and check valve in the water supply to the tank or heater.

1216 Miscellaneous.**1216.1 Drain Cock.**

All storage tanks shall be equipped with adequate drain cocks.

1216.2 Line Valves.

Valves in the water-supply distribution system, except those immediately controlling one fixture supply, when fully opened shall have a cross-sectional area of the smallest orifice or opening through which the water flows at least equal to the cross-sectional area of the nominal size of the pipe in which the valve is installed.

1216.3 Water Used for Processing.

Water used for cooling of equipment or similar purposes shall not be returned to the potable-water distributing system. When discharged to the building drainage system, the waste water shall be discharged through an indirect waste pipe or air gap.

1303.2 Small Piping.

Horizontal drainage piping of 3-inch diameter and less shall be installed with a fall of not less than $\frac{1}{4}$ -inch per foot.

1303.3 Large Piping.

Horizontal drainage piping larger than 3-inch diameter shall be installed with a fall of not less than $\frac{1}{8}$ -inch per foot.

1303.4 Minimum Velocity.

Where conditions do not permit building drains and sewers to be laid with a fall as great as that specified, then a lesser slope may be permitted provided the computed velocity will not be less than 2 fps.

1304 Fixture Units.**1304.1 Values for Fixtures.**

Fixture unit values as given in Table 1304.2 designate the relative load weight of different kinds of fixtures which shall be employed in estimating the total load carried by a soil waste pipe and shall be used in connection with the tables of sizes for soil, waste, and drain pipes for which the permissible load is given in terms of fixture units.

1304.2 Fixtures Not Listed.

Fixtures not listed in Table 1304.2 shall be estimated in accordance with Table 1304.3.

TABLE 1304.3

Fixture Drain or Trap Size	Fixture-Unit Value
1 $\frac{1}{4}$ -inches and smaller	1
1 $\frac{1}{2}$ -inches	2
2- inches	3
2 $\frac{1}{2}$ -inches	4
3- inches	5
4- inches	6

1304.3 Values for Continuous Flow.

For a continuous or semicontinuous flow into a drainage system, such as from a pump, pump ejector, air-conditioning equipment, or similar device, two fixture units shall be allowed for each gallon-per-minute of flow.

1305 Determination of Sizes for the Drainage System.**1305.1 Maximum Fixture-Unit Load.**

The maximum number of fixture units that may be connected to a given size of building sewer, building drain, horizontal branch, or vertical soil or waste stack is given in Tables 1305.2 and 1305.3.

1305.4 Minimum Size of Soil and Waste Stacks.

No soil or waste stack shall be smaller than the largest horizontal branch

TABLE 1304.2 — FIXTURE UNITS PER FIXTURE OR GROUP

Fixture Type	Fixture-Unit Value as Load Factors	Minimum Size of Trap ² Inches
1 Bathroom group consisting of water closet, lavatory and bathtub or shower stall.	Tank water closet 6 Flush-valve water closet 8	
Bathtub ¹ (with or without over head shower).	2	1½
Bathtub ¹ .	3	2
Bidet.	3	Nominal 1½
Clothes washer (domestic)	3	2
Clothes washer (commercial)	See 1304.4	See 1304.3
Combination sink and tray.	3	1½
Combination sink and tray with food disposal unit.	4	Separate traps 1½
Dental unit or cuspidor.	1	1¼
Dental lavatory.	1	1¼
Drinking fountain.	½	1
Dishwasher ² domestic.	2	1½
Floor drains ³ .	1	2
Kitchen sink, domestic.	2	1½
Kitchen sink, domestic with food waste grinder.	3	1½
Lavatory ⁴ .	1	Small P.O. 1¼ Large P.O. 1½
Lavatory ⁴ .	2	1½
Lavatory, barber, beauty parlor.	2	1½
Lavatory, surgeon's	2	1½
Laundry tray (1 or 2 compartments)	2	1½
Shower stall, domestic.	2	2
Showers (group) per head ² .	3	
Sinks.		
Surgeon's.	3	1½
Flushing rim (with valve).	8	3
Service (trap standard).	3	3
Service (P trap).	2	2
Pot, scullery, etc. ²	4	1½
Urinal, pedestal, syphon jet, blowout.	8	Nominal 3
Urinal, wall lip.	4	1½
Urinal stall, washout.	4	2
Urinal trough ² (each 2-ft. section)	2	1½
Wash sink ² (circular or multiple). each set of faucets.	2	Nominal 1½
Water closet, tank-operated.	4	Nominal 3
Water closet, valve-operated.	8	3
Water closet, low flush type.	1	

¹A shower head over a bathtub does not increase the fixture value.

²See Pars. 1304.3 and 1304.4 for methods of computing unit value of fixtures not listed in Table 1304.2 or for rating of devices with intermittent flows.

³Size of floor drain shall be determined by the area of surface water to be drained.

⁴Lavatories with 1¼ or 1½-inch trap have the same load value; larger P.O. plugs have greater flow rate.

(c) Pipe shall be set firmly according to line and grade, and, preparatory to making pipe joints, all surfaces of the portion of the pipe to be jointed shall be cleaned and dried. The joints shall then be carefully adjusted and filled with the jointing material.

(d) Trenches shall be kept water-free during jointing for a sufficient period thereafter to allow the jointing material to become fully set and completely resistant to water penetration. Trenches shall be backfilled immediately after pipe is laid therein to prevent dislocation of the sewer line or jointing material. (Note: Not applicable when factory applied flexible compression joints are used.)

C. Testing.

(a) The sewer line will be tested as required elsewhere herein, or as prescribed by local authority.

DESIGN, ASSEMBLY AND INSTALLATION INSTRUCTIONS FOR POLYBUTYLENE (PB 2110) PIPE AND TUBING

1. Markings—Pipe, tubing, and fittings shall be permanently marked as follows:

A. Pipe and tubing at intervals not more than 5 feet.

(1) Manufacturers name or trademark.

(2) NSF-PW

(3) PB 2110

(4) 100 psi @ 180°

(5) Size

(6) ASTM-3309

(7) Production date

(8) SDR-11

B. Fittings

(1) Manufacturer's name or trademark.

(2) NSF-PW

2. Installation—Because of the greater rate of thermal expansion of PB over metal piping (1" per each 10° F temperature change for each 100 feet of pipe or tubing) allowance must be made for linear movement of the piping. When installing long runs check the amount of space available for linear movement of the line before making the final connection.

Pipe expansion allowance shall be provided by the use of offsets in the line. On vertical pipe risers between floors, an offset of twelve inches shall be provided midway between the floor and ceiling. Pipe or tubing shall not be rigidly anchored to supports. Pipe and tubing shall be supported at not more than 3 foot intervals. Supports shall not compress, distort, cut or abrade the piping. Strap hangers shall be a minimum of ¾ inches wide.

All piping system components shall be aligned to eliminate stress. Pipe shall not be bent or pulled into position after being assembled. Fittings

shall be used for all changes of direction when pipe is used. For tubing installations change of direction fittings shall be used except when a minimum bending radius ten times the tubing diameter can be provided.

When pipe is installed through studs or joists, use oversized holes. Care should be taken in designing the installation so that thermal expansion and contraction does not concentrate excessive stresses at the pipe fittings and joists. In general it is best to absorb stresses resulting from thermal expansion and contraction in the pipe rather than in fittings and joints. This can be done by allowing for unrestricted movement in the pipe adjacent to and up to 24" from all fittings. (NOTE: Sections 2501 (a) and (c) of Volume I states that no combustible materials shall enter into the construction of wall, floor and room assemblies unless such assemblies have been tested in accordance with ASTM E-119 where the code requires such assemblies to have an hourly fire resistance rating.)

Caution shall be taken to prevent kinking and buckling of the tubing and, in its location and/or use, to prevent mechanical damage to the tubing.

Although PB pipe and tubing resists nail penetration because of its resilience, the same precautions used for protecting metal pipe from nail penetration should be used.

Because this material is non-metallic, PB pipe eliminates galvanic action. However, where electrical systems are traditionally grounded to the cold water piping, some alternate means of grounding is required when PB piping is used.

"Joints and connections shall be either of the spun weld type, flared insert type or *pressure-lock (which includes an internal elastomeric seal and metal retainer clip) type fittings* assembled in accordance with the manufacturer's assembly instructions."

The tubing and pipe shall be cut clean and square, preferably using a tubing cutter with thin, finely-honed cutting wheel designed specifically for plastic.

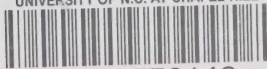
Pipe and tubing shall not be threaded. Transitions from plastic to metal shall be done with a threaded adapter or other listed and applicable transition fitting.

Only listed thread tape (for example, Teflon) or *listed* plastic thread lubricant shall be used. Conventional pipe thread compounds, putty lined oil base products and unknown mixtures *shall not* be used.

Tighten threaded, plastic joints approximately ($\frac{1}{2}$) to (1) turn past handtight. (Note: "Handtight" refers to the number of threads to reach handtight with metal pipe.) As in the use of metal pipe, experience will dictate tightness required.

This material is not intended for use at temperatures above 180° F and; therefore, may not be suitable for use with instantaneous type coil or immersion water heaters. This material is suitable for use with storage type water heaters; however, a minimum of 6 inches of metal pipe shall be installed between the hot water outlet and the PB pipe or tubing. A minimum of six inches clearance shall be maintained between the flue of liquid fuel fired water heaters and the PB pipe and tubing.

UNIVERSITY OF N.C. AT CHAPEL HILL



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